

## Summary

---

### PURPOSE AND SCOPE

This *Aquatic Habitat Conservation Plan and Candidate Conservation Agreement with Assurances* (AHCP/CCAA, the Plan) was prepared for the California timberlands of Green Diamond Resource Company (Green Diamond) to conserve habitat for and mitigate impacts on six aquatic species:

- *Oncorhynchus tshawytscha* (chinook salmon)
- *Oncorhynchus kisutch* (coho salmon)
- *Oncorhynchus mykiss* (steelhead and resident rainbow trout)
- *Oncorhynchus clarki clarki* (coastal cutthroat trout)
- *Ascaphus truei* (tailed frog)
- *Rhyacotriton variegatus* (southern torrent salamander)

The Plan is part of Green Diamond's applications to the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) for permits authorizing incidental take of listed species in accordance with the federal Endangered Species Act (ESA) and federal policies regarding conservation of unlisted species. NMFS is being asked to approve a habitat conservation plan (HCP) and incidental take permit (ITP) for listed and unlisted populations of three fish under its jurisdiction: chinook salmon, coho salmon, and steelhead. USFWS is being asked to approve a CCAA and enhancement of survival permit (ESP) for two unlisted fish and two unlisted amphibians under its jurisdiction: resident rainbow trout, coastal cutthroat trout, tailed frog, and southern torrent salamander. Table S-1 identifies the species covered by each of the Permits and indicates their current listing status. The ITP and ESP collectively are cited in this Plan as the "Permits." NMFS and USFWS collectively are cited as "the Services." The species identified in Table S-1 are cited as the "Covered Species."

The Plan provides the information and analysis required in the applications for the Permits and identifies the measures that Green Diamond will implement to:

- Minimize and mitigate the potential adverse effects of any authorized taking of listed Covered Species that may occur incidental to Green Diamond's activities in the area covered by the Plan and Permits;
- Ensure that any authorized take and its probable impacts will not appreciably reduce the likelihood of survival and recovery in the wild of any Covered Species; and
- Contribute to efforts to reduce the need to list currently unlisted Covered Species under the ESA in the future by providing early conservation benefits to those species.

An Implementation Agreement (IA) also has been prepared to accompany the applications to NMFS and USFWS. The IA defines the roles and responsibilities of the parties regarding the Plan and Permits, ensures implementation of the Operating Conservation Program identified in the Plan, describes procedures for modifications, and provides assurances to Green Diamond and the Services.

**Table S-1. The Covered Species**

Species Common Name, <i>Scientific Name</i>	Listing Status in HPAs	
	Federal	State
<b>Species Covered by the AHCP/ITP</b>		
Chinook salmon, <i>Oncorhynchus tshawytscha</i> California Coastal ESU Southern Oregon and Northern California Coastal ESU Upper Klamath/Trinity Rivers ESU	FT None None	None None None
Coho salmon, <i>Oncorhynchus kisutch</i> Southern Oregon/Northern California Coast ESU	FT	ST
Steelhead, <i>Oncorhynchus mykiss</i> Northern California DPS Klamath Mountains Province ESU	FT None	None None
<b>Species Covered by the CCAA/ESP</b>		
Resident rainbow trout, <i>Oncorhynchus mykiss</i>	None	None
Coastal cutthroat trout, <i>Oncorhynchus clarki clarki</i>	None	CSC
Tailed frog, <i>Ascaphus truei</i>	None	CSC
Southern torrent salamander, <i>Rhyacotriton variegatus</i>	None	CSC
<b>Codes</b> CSC California Department of Fish and Game Species of Special Concern DPS Distinct Population Segment ESU Evolutionarily Significant Unit FT Federal threatened species None Currently not listed, proposed for listing, a candidate for listing, or a CSC. ST State threatened species		

Both the Plan and the Permits have a term of 50 years. The geographic area in which the Plan will be implemented and where incidental take may occur is defined as Green Diamond's ownership within eleven Hydrographic Planning Areas (11 HPAs) on the west slopes of the Klamath Mountains and the Coast Range of California. 'Ownership' means fee-owned lands and lands where Green Diamond own harvesting rights. The Plan also covers up to 100 miles of road where Green Diamond owns and exercises road access rights within approved Timber Harvesting Plan (THP) areas. **Figure S-1** shows Green Diamond's ownership (Initial Plan Area) as of April 2005 and the boundaries of the HPAs. As indicated in Table S-1, the Initial Plan Area includes approximately 416,533 acres. As with other commercial timber operations, Green Diamond's ownership in the HPAs is expected to change over time. To address such changes, the Plan and IA allow for the Initial Plan Area to expand or contract within certain limits. As depicted in **Figure S-1**, the Plan identifies an Eligible Plan Area that includes both the Initial Plan Area and commercial timberlands that potentially could become part of Green Diamond's ownership. These other lands are identified as the Adjustment Area and include approximately 291,377 acres.

**Table S-2. Estimated acreage of the Initial Plan Area, Adjustment Area, and Hydrographic Planning Areas (HPAs).**

HPA Name (Type <sup>1</sup> )	Hydrographic Planning Areas (HPAs)				
	Eligible Plan Area (EPA)			Non-EPA <sup>5</sup> (acres)	Total HPA (acres)
	Initial Plan Area <sup>2</sup> (acres)	Adjustment Area <sup>3</sup> (acres)	Total EPA <sup>4</sup> (acres)		
Smith River HPA (Hydrographic Area)	44,177	8,140	52,318	129,681	181,999
Coastal Klamath HPA (Hydrographic Area)	88,760	5,300	94,060	14,090	108,150
Blue Creek HPA (Hydrologic Unit)	15,393	35	15,428	64,875	80,303
Interior Klamath HPA (Hydrographic Area)	66,139	43,217	109,357	18,649	128,006
Redwood Creek HPA (Hydrologic Unit)	33,038	67,693	100,731	87,604	188,335
Coastal Lagoons HPA (Hydrographic Area)	39,981	4,678	44,659	8,932	53,592
Little River HPA (Hydrologic Unit)	26,041	1,908	27,949	1,753	29,703
Mad River HPA (Hydrographic Area)	49,376	49,787	99,163	20,523	119,686
North Fork Mad River HPA (Hydrologic Unit)	28,209	3,207	31,416	0	31,416
Humboldt Bay HPA (Hydrographic Area)	17,484	21,386	38,870	99,849	138,719
Eel River HPA (Hydrographic Area)	7,933	86,026	93,958	111,202	205,160
<b>TOTAL</b>	<b>416,533</b>	<b>291,377</b>	<b>707,909</b>	<b>557,158</b>	<b>1,265,069</b>
<b>Notes</b>					
1 HPAs that encompass the entire drainage are referred to as hydrologic units. HPAs that encompass multiple watersheds or a fraction of one watershed are referred to as hydrographic areas.					
2 The Initial Plan Area includes 413,064 acres of fee owned land and 3,469 acres of harvesting rights..					
3 Estimated acreage of the Adjustment Area as of the effective dates of the Permits; includes other commercial timberlands potentially available for addition to the Plan Area as of the effective date of the Permits; estimate excludes non-forested commercial timberlands, a large tract of land proposed for conservation commitments, and commercial timberlands covered by an approved HCP.					
4 Estimated acreage based on configuration of Initial Plan Area and Adjustment Area as shown in <b>Figure 1-2</b> .					
5 Estimated acreage includes developed and undeveloped privately owned lands, all public lands, Native American lands, and commercial timberlands excluded from the estimated acreage of the initial Adjustment Area (see note 3 above).					

The activities covered by the Plan and Permits (Covered Activities) include timber operations and related management activities on Green Diamond's ownership in the HPAs and the activities needed to carry out all measures identified in the Plan. Timber operations and related management activities include but are not limited to: felling and bucking timber, yarding timber, loading and other landing operations, salvaging timber products, transporting timber and rock products, road construction and maintenance, rock pit construction and use, water drafting, equipment maintenance, regeneration harvest, site preparation, prescribed burning, slash treatment, planting, pre-commercial thinning and pruning, commercial thinning, and the collection and transport of minor forest products such as burls, stumps, boughs, and greenery. All Covered Activities will be implemented in accordance with the impact avoidance, minimization, and mitigation measures identified in Section 6.2 of the Plan, California Forest Practice Rules (FPRs), Green Diamond's Northern Spotted Owl HCP, and other applicable federal and state regulations.

## **THE COVERED SPECIES AND THEIR HABITAT**

Each Covered Species is a cold-water adapted species whose habitat requirements make it sensitive to the potential impacts of timber management. Within the Plan Area, the Covered Species occupy a wide range of stream reaches based on their specific habitat requirements and biological adaptations. The larger streams tend to be used by the fish species, while smaller tributaries are primarily used by the amphibians.

The four fish Covered Species are members of the Salmonid family and exhibit varying levels of anadromy. Within the Plan Area, chinook and coho salmon are exclusively anadromous; rainbow trout exhibit both anadromous (steelhead) and resident forms; and cutthroat trout mostly exist as resident populations, but limited anadromy does occur. Chinook and coho salmon die after spawning, while rainbow trout (including steelhead) and coastal cutthroat trout can survive to spawn more than once. All four of the salmonids are potentially responsive to changes in five variables: water supply, temperature, nutrients, large woody debris (LWD), and sediment. In this regard, their habitat is largely a function of the interaction of flowing water, sediment, and structures in stream channels and the adjacent riparian area. Stream channels encompass the area where water flows most of the time and the floodplain above the bankfull channel margin that are sporadically inundated at higher flows.

Stream habitat for the two amphibian Covered Species (southern torrent salamander and tailed frog) generally occurs upstream from salmonid habitat in the smaller headwater portions of streams with cold water and clean gravels and in seeps or springs. Compared to lower stream reaches, headwater streams tend to have higher gradients and more confined channels. Larval stages of both amphibians are aquatic obligates and prefer riffle habitats that have clean cobble and gravel with minimal fine sediment accumulation. However, under certain circumstances, both can persist in streams with temporary periods of subsurface flow during the late summer and early fall. Adults of both species have limited dispersal abilities and are seldom found outside the stream or riparian strip. Tailed frogs appear to have somewhat greater tolerances for increases in water temperature than southern torrent salamanders; and springs and seeps that are vital habitat for torrent salamanders are of limited value to tailed frogs.

## **CURRENT STATUS OF AQUATIC HABITAT AND COVERED SPECIES IN THE ELIGIBLE PLAN AREA AND HPAs**

As part of the development of the Plan, Green Diamond compiled and analyzed information about the HPAs as a whole and the Eligible Plan Area within each HPA. The information and analysis regarding the Eligible Plan Area is based primarily on studies conducted on Green Diamond's ownership in the HPAs. The premise of this approach is that the watercourses and watersheds which were studied encompass the range of conditions found on Green Diamond's entire ownership in the HPAs and also are representative of conditions on other commercial timberlands in the same area (i.e., in the Adjustment Area). This premise is supported by the location of the Adjustment Area lands in the same watersheds as the Initial Plan Area and their common history and characteristics as commercial timberlands.

The information compiled for the assessment of current conditions includes:

- A description of the geology and geomorphology of the entire area encompassed by the 11 HPAs and the features within each HPA;
- Water temperature profiles collected in all 11 HPAs from a total of 109 Class I and 66 Class II watercourses;
- Monitoring data for "treatment" and "control" sites on eight Class II watercourses in three HPAs (Smith River, Little River, and Mad River);
- Channel and habitat typing assessments for 58 streams (230 miles of stream channel) in nine HPAs (Smith River, Coastal Klamath, Blue Creek, Interior Klamath, Little River, Mad River, North Fork Mad River, Humboldt Bay, and Eel River);
- LWD inventories of 20 streams in seven HPAs (Smith River, Coastal Klamath, Blue Creek, Interior Klamath, Little River, Mad River, North Fork Mad River, and Humboldt Bay);
- LWD inventory for Prairie Creek in Redwood National Park, conducted by NMFS and Redwood National Park (Redwood Creek HPA);
- Channel monitoring data for five Class I watercourses in five HPAs (Smith River, Coastal Klamath, Mad River, North Fork Mad River, and Humboldt Bay);
- A retrospective study of sediment delivery from Class III watercourses based on 100 sites in THPs completed between 1992 and 1998, including sites in all 11 HPAs;
- Data from fish presence/absence surveys conducted in Plan Area streams in all 11 HPAs;
- Juvenile salmonid population estimates based on sampling surveys conducted in eight streams in five HPAs (Smith River, Coastal Klamath, Little River, Mad River, and North Fork Mad River);
- Results of out-migrant smolt trapping in four streams in the Little River HPA;

- Results of spawning surveys in 16 streams in six HPAs (Smith River, Coastal Lagoons, Little River, Mad River, North Fork Mad River, and Humboldt Bay); and
- Results of surveys for tailed frogs and southern torrent salamanders in 68 and 67 streams respectively in nine HPAs (Smith River, Coastal Klamath, Blue Creek, Interior Klamath, Redwood Creek, Mad River, North Fork Mad River, Humboldt Bay, and Eel River) and in additional sites outside the HPAs.

Results of the assessment indicate the following:

Geologic and geomorphic factors. The lands in the 11 HPAs are characteristic of the steep and rugged terrain of the Coast Ranges and Klamath Mountains. The underlying geologic formations are marked by extensive folds, fault lines, and several types of unstable soils. The entire area is subject to high hazard from potential earthquakes occurring on several onshore faults. Deep-seated and shallow landslides are common throughout the area. The Redwood Creek, Mad River, Humboldt Bay, and Eel River HPAs have weakly consolidated geologic composition; the other HPAs have relatively stable and/or mixed geologic composition. The Coastal Klamath and Interior Klamath HPAs are less subject to deep-seated landslides than the other HPAs but are highly susceptible to shallow landslides.

Overall habitat conditions. Seven day moving average summer water temperatures in approximately 94% of all assessed streams were at or below 17.4 °C. Applying the monitoring thresholds developed for the Plan, water temperatures at five locations would have triggered adaptive management responses (see “Effectiveness Monitoring” and “Adaptive Management”). The five sites are Coyote Creek in the Redwood Creek HPA, lower and middle Cañon Creek in the Mad River HPA, Salmon Creek in the Humboldt Bay HPA, and Stevens Creek in the Eel River HPA. On the streams where channel and habitat typing was conducted mean canopy closure ranges from 36% to 99%; deciduous trees dominate the canopy along the riparian margin; the percentage of total stream length in pools varies from 4% to 81%; and average maximum residual pool depth is 2 feet. Relatively high levels of fine sediments were found in most assessed streams in the Redwood Creek, Humboldt Bay, and Eel River HPAs and in portions of the Coastal Klamath, Coastal Lagoons, Little River, Mad River, and North Fork Mad River HPAs. Class I watercourses are generally deficient in larger classes of LWD, which limits the amount and quality of pool habitat. Assessed streams in the Little River HPA had the highest amount and quality of LWD and pool habitat. All of the assessed Plan Area streams had fewer pieces of in-stream LWD per 100 feet of channel than Prairie Creek in Redwood National Forest; the average LWD count was 4 to 5 pieces per 100 feet for the Plan Area streams and 7 pieces for Prairie Creek.

Habitat conditions for Covered Species. Water temperatures generally are suitable for all Covered Species in the assessed streams but potentially limiting in the watercourses where the highest average temperatures were recorded and in the Eel River HPA overall because of its southern and inland warmer climate. Access to spawning habitat by the anadromous salmonids is limited in the Interior Klamath, Redwood Creek, Mad River, and North Fork Mad River HPAs due to stream gradient or falls and cascades and in the Coastal Lagoon HPA dependent on lagoon breaching. Summer and winter rearing habitat generally is limited in all HPAs due to the deficit of large size-class LWD and pools. Ample habitat for the amphibian Covered Species is available in headwater streams in most HPAs, except in the streams with high levels of fine sediment in the

Coastal Lagoons, Little River, Mad River, and Humboldt Bay HPAs and in the Eel River HPA which has limited potential habitat.

Occurrence of Covered Species. Chinook, coho salmon, and steelhead occur in all HPAs, but are limited in or precluded from streams where access to spawning habitat is limited by steep gradients or other barriers and where water temperatures are limiting. In the Interior Klamath HPA only resident rainbow trout and coastal cutthroat trout occur in many of the Class I watercourses. Cutthroat trout are particularly abundant in the Coastal Lagoons HPA, likely due to reduced competition with the anadromous salmonids. Streams in the Little River HPA support the highest population levels of all four salmonids, especially coho salmon. The salmonids generally are scarce throughout the Eel River HPA. Green Diamond has documented tailed frogs and southern torrent salamanders in all HPAs except the Eel River HPA. Where found, the amphibians are generally widespread and abundant, except in the Interior Klamath and Humboldt Bay HPAs.

## **POTENTIAL IMPACTS TO COVERED SPECIES AND THEIR HABITATS THAT MAY RESULT IN TAKE**

In addition to assessing current conditions, Green Diamond evaluated the potential for Covered Activities to have direct, indirect, and cumulative effects that could result in take of Covered Species. This evaluation focused on the potential for Covered Activities to:

- Alter hydrology,
- Increase sediment delivery from surface erosion or mass wasting,
- Adversely affect LWD recruitment,
- Alter water temperature and nutrient inputs,
- Create barriers to fish and amphibian passage, or
- Entail the use of equipment that could cause localized instances of direct harm.

The evaluation also took into account factors that may influence the responses of Covered Species to the effects of Covered Activities, including species' diversity and adaptability, physical and vegetative conditions, harvest methods, biotic interactions, and wide-ranging migratory behaviors. These other factors were considered because their effects on one or more life stages of a species that were considered their effects on one or more life stages of a species ultimately can limit the growth of a population. A factor that acts on a single life stage can be viewed as the limiting factor or "bottleneck" for the population or species. Green Diamond assessed the HPAs to determine which factors have a greater probability of being limiting and then assessed the Covered Activities to determine how they might cause or contribute to population "bottlenecks."

Summary results of the assessment are as follows:

1. For the salmonids, available summer and winter rearing habitat is most likely to be limiting in most HPAs. If this is true, the interaction of excess coarse sediment input and a lack of LWD will have the greatest potential to negatively impact the local and regional population of these species. Fine sediment inputs are less likely to be limiting, because it tends to have the greatest impact on spawning success. However, given the high potential for fine sediments to be transported downstream, the cumulative effect of multiple sources of fine sediment inputs throughout a sub-basin over extended periods could impair the feeding efficiency of juvenile salmonids and cause local or regional population declines.
2. For the two amphibians, excess sediment inputs, both coarse and fine, have the greatest potential to limit habitat and deter beneficial conservation efforts. However, rather than eliminating pool formation, the greatest impact will be the embedding of riffle habitat that eliminates the interstices in the substrate on which the larval phases of these species depend.
3. Altered hydrology has the potential to impact the Covered Species in both positive and negative ways. Green Diamond does not believe that altered hydrology by itself could be a limiting factor for any of the Covered Species. However, it has the potential to exacerbate a situation in which there is excess sediment inputs with too little LWD present. Because the effect is cumulative, the hydrology of a large portion of a sub-basin or watershed would need to be altered before the magnitude of the response would be large enough to impact the Covered Species.
4. Water temperature, as a single factor, has the potential to be limiting for all of the Covered Species. All of the Covered Species are considered "cold water adapted," and each has relatively discrete upper thermal limits above which harm or death occurs. However, streams throughout the HPAs generally do not have temperatures that are at or near these upper thresholds. A few isolated streams or stream reaches have water temperatures that could cause local declines in populations of Covered Species but are not likely to be potentially responsible for regional declines.
5. Barriers, both partial and complete, can limit local populations when all other habitat factors are good. As a result, the cumulative impact of barriers has the potential to limit populations over both a local and regional scale. However, within the HPAs, anthropogenic barriers are relatively isolated so the impact of these barriers tends to only have localized impacts.
6. Use of equipment with the potential for direct take will affect individuals but, because of the localized and stochastic nature of the events, will not likely result in even local impacts on populations of Covered Species.

The complicated nature of the potential limiting factors makes it impossible to definitively assess the extent of the potential impact of take on the Covered Activities associated with any given factor. To account for this concern, Green Diamond formulated a conservation program that addresses all factors as if they are limiting for Covered Species in each HPA and provides for significant improvements in each factor over baseline conditions in all HPAs. With a few exceptions where HPA-specific measures



are proposed, the measures designed to address each limiting factor will be applied throughout all 11 HPAs as if that factor were in fact limiting throughout the Plan Area. Under these conditions, the Plan will not result in negative cumulative effects. The incremental effect of Plan implementation will be positive compared with existing baseline conditions and will result in generally improving habitat conditions for the Covered Species over the term of the Permits in all HPAs. Therefore, Plan implementation will not result in negative cumulative effects.

## **CONSERVATION PROGRAM**

The conservation program that Green Diamond will implement is based on biological goals and objectives and includes measures to minimize and mitigate the impacts of incidental take, maintain and improve habitat conditions for the Covered Species, monitor implementation and effectiveness of the Plan, institute adaptive management, and respond to changed and unforeseen circumstances. The measures collectively are identified in the Plan as “Green Diamond’s Operating Conservation Program.”

### **Biological Goals and Objectives**

The biological goals and objectives of the Plan are based on the habitat requirements and life cycles of the Covered Species and reflect in biological terms the intended result of the Operating Conservation Program. Five goals have been established for the Plan:

1. Maintain cool water temperature regimes that are consistent with the requirements of the individual species,
2. Minimize and mitigate human-caused sediment inputs,
3. Provide for the recruitment of LWD into all stream classifications so as to maintain and allow the development of functional stream habitat conditions,
4. Allow for the maintenance or increase of populations of the amphibian Covered Species in the Plan Area through minimization of timber harvest-related impacts on the species, and
5. Monitor and adapt the Plan as new information becomes available, to provide those habitat conditions needed to meet the general goals that benefit the Covered Species.

Objectives that identify measurable parameters for each goal also have been set and are identified in the Effectiveness Monitoring and Adaptive Management Measures of the Operating Conservation Program.

### **Green Diamond’s Operating Conservation Program**

Development of the specific conservation measures that comprise Green Diamond’s Operating Conservation Program was guided by the biological goals and objectives stated above. The measures are grouped into ten categories:

- |                                       |                              |
|---------------------------------------|------------------------------|
| 1. Riparian Management                | 6. Adaptive Management       |
| 2. Slope Stability                    | 7. Implementation Monitoring |
| 3. Road Management                    | 8. Special Project           |
| 4. Harvest-related Ground Disturbance | 9. Changed Circumstances     |
| 5. Effectiveness Monitoring           | 10. Unforeseen Circumstances |

A summary description of each group of measures is provided below, with an emphasis on the overall purpose and focus of the measures. The complete list and exact wording of all measures are stated in Section 6.2 of the Plan.

### ***Riparian Management***

The riparian zone adjacent to streams is a vital component of salmonid and amphibian habitat, providing temperature control, nutrient inputs, channel stability, sediment control, and LWD recruitment. Following the distinctions used in California's Forest Practice Rules (FPRs), the Riparian Management Measures are directed at three broad classes of watercourses (Class I, Class II, and Class III). The purpose of the measures is to maintain and enhance the key riparian functions of such watercourses. Measures include but are not limited to:

1. Establishing Riparian Management Zones (RMZs) of specified widths and each with an inner and outer zone along all Class I and II watercourses, as summarized in Table S-3;
2. Requiring the outer zone of Class I RMZs to be extended, where necessary, to cover the entire floodplain and, depending on slope, an additional 30-50 feet beyond the outer edge of the floodplain;

**Table S-3. Watercourse classes and minimum buffer widths.**

Watercourse Class	Further Subdivisions	Total Width <sup>2</sup>	Inner Zone Width	Outer Zone Width
Class I	None	150 ft RMZ	50-70 ft	80-100 ft
Class II	2 <sup>nd</sup> order or larger	100 ft RMZ	30 ft	75 ft
	1 <sup>st</sup> order <sup>1</sup>	75 ft RMZ	30 ft	45 ft
Class IIIA	Depends on terrains	30 ft EEZ	NA	NA
Class IIIB	Depends on terrains	50 ft EEZ plus tree retention	NA	NA
<b>Notes</b>				
1 Some Class II-1 watercourses will receive the protections of Class II-2 watercourses.				
2 one side.				

3. Establishing Equipment Exclusion Zones (EEZs) of specified widths along Class III watercourses (see Table S-3), and designating Class I and II RMZs as EEZs except for the limited circumstances identified in the Plan;
4. Allowing only a single harvest entry into Class I and II RMZs over the term of the Permits;

5. In Class I and II RMZs, requiring at least 85% overstory canopy closure in the inner zone and 70% in the outer zone, prohibiting the harvest of trees that contribute to maintaining bank stability, requiring the retention of all safe snags, limiting salvage activities, and requiring mulching and seeding of ground disturbances larger than 100 square feet; and
6. In Class I RMZs and within the first 200 feet of Class II RMZs adjacent to Class I RMZs, prohibiting harvest of trees that are judged likely to recruit to the watercourse.

### ***Slope Stability***

The purpose of the Slope Stability measures is to: 1) reduce management-related sediment delivery to the aquatic system from landslides, and 2) reduce landslide-related erosion that might occur in specific portions of the landscape. Slope stability and erosion problems associated with Plan Area roads are addressed separately under "Road Management."

The Slope Stability measures focus on THP-level identification of areas prone to mass wasting and the application of specific prescriptions to those areas. Initial default prescriptions are identified for Plan Area lands within each HPA, with HPAs that share common geologic and geomorphic characteristics grouped together. Implementation of the measures will occur on a plan-by-plan basis concurrently with slope stability and mass wasting assessments described under "Effectiveness Monitoring". The initial default prescriptions will be revised based on the results of the monitoring projects. Initial default slope stability prescriptions may also be modified on a plan-by-plan basis through an onsite review by a qualified geologist. Covered Activities that involve geologic issues and require the expertise of a professional geologist (PG) will be carried out by, or occur under the supervision of, a PG as required by California law.

Initial slope stability measures include but are not limited to:

1. Training all Registered Professional Foresters (RPFs) who write THPs for Green Diamond to identify and more fully understand the Slope Stability Measures as well as the possible implications of various timber management scenarios for landslide and other unstable areas.
2. Identifying in THPs: a) all steep streamside slopes (SSS) leading to Class I or II watercourses based on initial slope gradients specified for each HPA (Table S-4); b) all headwall swales; c) all active deep-seated landslides; and d) in certain circumstances, shallow rapid landslides;
3. In THP areas with identified SSS, establishing an SSS zone of specified widths (see Table S-4), each comprised of an inner Riparian Slope-stability Management Zone (RSMZ), an outer RSMZ, and a Slope-stability Management Zone (SMZ);
4. In the Coastal Klamath and Blue Creek HPAs, prohibiting harvesting in the inner and outer RSMZs on all Plan Area lands;

5. In all HPAs except Coastal Klamath and Blue Creek, prohibiting harvesting in inner RSMZs and requiring 85% overstory canopy retention in outer RSMZs on Plan Area lands with Class I or II-2 watercourses; and requiring 85% overstory canopy retention in inner RSMZs and 75% in outer RSMZs on Plan Area lands with Class II-1 watercourses;
6. In all HPAs, limiting harvesting in an SMZ or headwall swale to one entry during the term of the Permits and prohibiting harvesting 25 feet upslope from an active deep-seated landslide; and identifying single tree selection as the initial silvicultural prescription in SMZs and headwall swales;
7. In all HPAs, prohibiting harvesting 25 feet upslope of shallow landslides without a geologic review; and
8. In all HPAs, requiring Green Diamond to avoid road construction in SSS zones and field verified headwall swales, where feasible, and across active deep-seated landslide toes or scarps or on steep (greater than 50% gradient) areas of dormant slides except as approved by a PG and a RPF with experience in road construction in steep forested terrain.

**Table S-4. Slope gradient for determining steep streamside slopes (SSS) and SSS zone widths for Class I and II watercourses, by HPA.**

HPA	Slope Gradient	SSS Zone Slope Distance from Watercourse Transition Line (feet)		
		Class I <sup>1</sup>	Class II-2 <sup>2</sup>	Class II-1 <sup>2</sup>
Smith River	65%	150 <sup>3</sup>	100 <sup>3,4</sup>	75 <sup>3</sup>
Coastal Klamath and Blue Creek	70%	475	200	100
Interior Klamath, Redwood Creek, Coastal Lagoons, Little River, Mad River, and North Fork Mad River	65%	200	200	75 <sup>3</sup>
Humboldt Bay and Eel River	60%	200	200	75 <sup>3</sup>
<b>Notes</b> 1 The inner RSMZ on all Class I watercourses will be 70 feet, except where a qualifying slope break exists within that distance. In that case, the inner RSMZ may only extend to the slope break, and the outer zone, if any, will be the remainder of the applicable RMZ distance except where a qualifying slope break exists within that distance. 2 The inner RSMZ on all Class II watercourses will be 30 feet, except where a qualifying slope break exists within that distance. In that case, the inner RSMZ may only extend to the slope break, and the outer zone, if any, will be the remainder of the applicable RMZ distance except where a qualifying slope break exists within that distance. 3 Maximum SSS zone is equal to the RMZ width, but the RSMZ prescriptions will apply. 4 There are no data available for Class II-2 watercourses in the Smith River HPA; values presented here are based on Class I watercourses.				

### ***Road Management***

The purpose of the Road Management Measures is to reduce sediment delivery into watercourses from road sources, including surface erosion from roads, road-related landslides, and watercourse crossing failures (washouts and diversions). In general, chronic surface erosion delivers sediment every winter, whether or not there are any large storms. Sediment delivery from chronic road erosion is generally greatest on roads that are used during the winter, and where ditches are connected to watercourses. Newly constructed roads also exhibit increased risk of surface erosion for the first several years following construction. Sediment delivery from road-related landslides and watercourse crossing failures are episodic in nature, are linked to large storm events, and deliver relatively large quantities of sediment to watercourse channels. The risk is typically greatest on old or abandoned roads with undersized culverts that are not properly maintained.

The Road Management Measures address sediment delivery in two primary ways: 1) through an accelerated schedule of road decommissioning and upgrading; and 2) through the systematic application of standards for the construction, management, and use of roads and related facilities. The measures will be implemented concurrent with the road-related sediment delivery assessments described under "Effectiveness Monitoring" and will be revised as appropriate based on monitoring results. Measures include but are not limited to:

1. Conducting a detailed assessment of road-related sediment sources in each of 58 sub-watershed road work units (RWUs) that encompass the existing road network on Green Diamond's fee owned lands in the Plan Area, with the order in which the RWUs are assessed based on a ranking of their biological, geomorphic, and road-related features.
2. Prescribing and implementing erosion control and erosion prevention measures in connection with the decommissioning or upgrading of roads at each site where treatable sources of erosion are identified, including but not limited to measures such as road surfacing, dispersing runoff into stable vegetated filter areas, armoring with rock rip-rap, end hauling waste material to stable locations, constructing dips and waterbars, mulching, and revegetating disturbed surfaces.
3. Prioritizing sites for treatment as "high," "moderate" or "low" based on (a) projected volume of future sediment delivery; (b) treatment immediacy; and (c) treatment cost-effectiveness;
4. Providing approximately \$2.5 million per year during the first 15 years of the Permits' term for the specific purpose of accelerating the treatment of "high" and "moderate" sites;
5. Implementing the prescribed treatments at all "high" and "moderate" sites within the term of the Permits;
6. Adhering to the time-of-year restrictions identified in Table S-5 for road work and use of roads and related facilities in the Plan Area;

**Table S-5. Time periods when road work, road use, and harvest-related ground disturbances may/may not occur within the Plan Area.**

Activity	Nov. 16 –April 30	May 1-May 14	May 15-Oct. 15	Oct. 16-Nov. 15
Road Decommissioning	None	None	Yes	Yes if <sup>(1, 3)</sup>
Road Upgrades	None	Yes if <sup>(2)</sup>	Yes	Yes if <sup>(1, 3)</sup>
New Road Construction	None	None	Yes	None
New Landing Construction	None	None	Yes	None
Hauling and Loading On rocky surfaces On unsurfaced roads	Yes None	Yes Yes if <sup>(2)</sup>	Yes Yes	Yes Yes if <sup>(1)</sup>
Helicopter Landing Areas	Same as for road use	Same as for road use	Same as for road use	Same as for road use
Vehicle Use of Unsurfaced Seasonal Roads	ATVs only	Yes if <sup>(2)</sup>	Yes	Yes if <sup>(1)</sup>
Use of Landings and Roadside Deckings within RMZs <sup>(4)</sup>	None	None	Yes if <sup>(5)</sup>	None
Mechanized Site Preparation	None	None	Yes	None
Ground-Based Yarding – Tractor, Skidder, and Forwarder	None	Yes if <sup>(6)</sup>	Yes	Yes if <sup>(6)</sup>
Ground-Based Yarding – Feller-Buncher and Shovel Logging	Yes if <sup>(6)</sup>	Yes	Yes	Yes
Skyline and Helicopter Yarding	Yes	Yes	Yes	Yes
Skid Trail Construction and Reconstruction	None	None	Yes	None
<b>Notes</b> 1 Cumulative rainfall from September 1 <sup>st</sup> through October 15 <sup>th</sup> is less than 4" and activity will cease when cumulative rainfall reaches 4". 2 No measurable rainfall has occurred within the last 5 days and no rain is forecast by the National Weather Service for the next 5 days. 3 A project can be completed in one day and erosion control structures can be installed. If a site requires multiple days for completion, a long-range National Weather Service forecast of no rain for the next 5 days is required. 4 Any proposed use of existing landings and alternatives to roadside decking will be discussed and mapped in THPs and also included on the THP map submitted to the Services. 5 Ditchlines and drainage facilities associated with existing roads within RMZs that are used for landings or roadside decking (May 15 <sup>th</sup> through October 15 <sup>th</sup> ) will be repaired immediately following completion of operations and prior to October 16 <sup>th</sup> . 6 Conditioned on use of procedures and limitations specified in Plan.				

7. Requiring that log hauling, road decommissioning, road upgrading, road construction, and use of landings cease, regardless of the time of year, if any portion of a road or landing would result in runoff of waterborne sediment in amounts sufficient to cause a visible increase in turbidity in any ditch or road surface that drains into a Class I, II, or III watercourse.
8. On fee-owned lands and harvesting-rights areas where Green Diamond has exclusive road-use rights, conducting inspections and implementing repairs and maintenance of mainline roads, roads appurtenant to THPs, secondary roads, and roads not yet decommissioned in accordance with the schedules and standards identified in the Plan;
9. Requiring that maintenance and repairs be prioritized based on treatment immediacy, with the goal being to complete all priority tasks prior to the winter period.
10. Requiring that, where feasible, new roads be located on or close to ridge tops or on benches where the road prism can be built with the least soil displacement and be constructed in accordance with the standards identified in the Plan;
11. Classifying new roads that are designed for a single-use in a THP as temporary and decommissioning such roads upon completion of operations;
12. Limiting width of new roads to 16 to 18 feet of running surface for mainline roads and 14 to 16 feet for secondary and temporary roads, with a combination of outsloped and crowned roads plus inside ditches where appropriate and occasional turnouts.
13. Limiting the final grade of new roads to no more than 15%, except to avoid unstable slopes, steep slopes, inner gorges, inner gorge crossings, or to access a suitable watercourse crossing location, as measured in minimum 100-foot increments.
14. Designing all new permanent watercourse crossing culverts to handle a 100-year return interval flow event without overtopping;
15. Conducting emergency inspections of all accessible rocked roads in the affected area if a storm occurs that produces three inches of precipitation or more in a 24-hour period, and prioritizing and scheduling repairs so they are accomplished as soon as possible.
16. Requiring that water drafting from Class I or II watercourses, impoundments, and gravity-fed water storage systems conform to the pumping rates and screen design specifications in the Plan;
17. Prohibiting the use of herbicide mix trucks in direct drafting of water from any watercourse;
18. Prohibiting the establishment of new rock quarries and borrow pits within Class I or II RMZs or the use of an existing rock quarry or borrow pit within 150 feet of a Class I, 100 feet of a Class II-2, or 70 feet of a Class II-1 watercourse;

19. Requiring that rock quarrying, rock extraction from borrow pits, and hauling not result in a visible increase in turbidity in watercourses or hydrologically connected facilities that discharge into watercourses; and
20. Training foresters, field supervisors, and equipment operators to conduct road decommissioning, road location and design, road construction, road upgrading, and road maintenance in accordance with the measures of the Plan.

### ***Harvest-related Ground Disturbance***

The purpose of the Harvest-related Ground Disturbance Measures is to reduce sediment delivery to watercourses from activities conducted as part of timber harvesting operations. Measures include but are not limited to:

1. Adhering to the time-of-year restrictions identified in Table S-5 for mechanized site preparation, ground-based yarding, skyline and helicopter yarding, and skid trail construction and reconstruction;
2. Requiring that all site preparation operations be designed to limit the amount of ground and forest floor disturbance to that which is required for fuel reduction and reforestation operations;
3. Designing prescribed fire operations to produce low intensity burns; limiting fireline construction, reconstruction, and use within RMZs and EEZs; and requiring that firelines not in an RMZ or EEZ have drainage facilities adequate to prevent the delivery of sediments to RMZs or EEZs;
4. Implementing erosion control measures in RMZs or EEZs in areas disturbed by felling, bucking, and yarding activities;
5. Prohibiting the use of ground-based yarding systems that require constructed skid trails on slopes over 45%, unless greater soil or riparian zone disturbance would be expected from cable yarding;
6. Prohibiting the use of ground-based yarding or skidding equipment in RMZs or EEZs adjacent to Class I, II and III watercourses, except for the limited circumstances identified in the Plan; and
7. Requiring that field trials of mechanized equipment for silvicultural operations not be conducted unless the Services are provided with documentation that the equipment will not cause compaction or soil displacement measurably greater than the equipment or methods previously used.

### ***Effectiveness Monitoring***

The purpose of the Effectiveness Monitoring Measures is to track the success of the Operating Conservation Program in relation to the Plan's biological goals and objectives and provide the basis for the Adaptive Management Measures. Four categories of projects will be implemented: Rapid Response Monitoring, Response Monitoring, Long-term Trend Monitoring/Research, and Experimental Watersheds Program.



Rapid Response Monitoring. Rapid Response Monitoring projects include: (1) annual property-wide water temperature monitoring in Class I and Class II watercourses; (2) before-after-control-impact (BACI) water temperature monitoring in paired sites on Class II watercourses; (3) monitoring of spawning gravel permeability in selected Class I watercourses; (4) monitoring of road-related delivery of fine sediments into Plan Area streams and evaluation of the effectiveness of the Road Management Measures in reducing those inputs; (5) BACI monitoring of changes in larval populations of tailed frogs; and (6) BACI monitoring of changes in the persistence of sub-populations of southern torrent salamanders.

Response Monitoring. Response Monitoring measures include: (1) measuring changes in reaches of Class I watercourse at least every other year for the duration of the Permits; and (2) BACI monitoring of sediment delivery from Class III watercourses.

Long-term Trend Monitoring/Research. Long-term Trend Monitoring/Research projects include: (1) monitoring the effectiveness of the road decommissioning and upgrading measures in reducing road-related mass wasting; (2) delineation of minimum slope gradients and maximum slopes distances for Plan Area lands in each HPA, with the results used to modify the corresponding Slope Stability Measures; (3) evaluation of the effectiveness of the SSS prescriptions based on landslide-relevant data collected in the Plan Area over the first 15 years of Plan implementation; (4) a two-stage assessment of the relationship between mass wasting processes and timber management processes; (5) channel and habitat typing assessments of selected Plan Area streams; (6) LWD surveys on the stream reaches selected for channel and habitat typing; (7) annual summer sampling surveys to estimate young of the year coho and age 1+ steelhead and coastal cutthroat trout; and (8) annual out-migrant trapping in the Little River HPA to monitor smolt abundance, size, and out-migration timing.

Experimental Watersheds Program. Green Diamond will designate the Little River HPA, South Fork Winchuck River in the Smith River HPA, Ryan Creek in the Humboldt Bay HPA, and Ah Pah Creek in the Coastal Klamath HPA as experimental watersheds for additional monitoring and research. Projects in the four watersheds will include: (1) Effectiveness Monitoring that due its complexity and expense of implementation can only be applied in limited regions (i.e., turbidity monitoring, Class III sediment monitoring, and road-related mass wasting); (2) BACI studies of harvest and non-harvest areas; (3) BACI studies of conservation and management measures; and (4) development and implementation of new or refined monitoring and research protocols. In addition, Green Diamond may expand out-migrant trapping in the Little River HPA to one or more of the other experimental watersheds. No monitoring or research which involves the application of measures other than those prescribed in this Plan will occur without the concurrence of the Services.

Monitoring thresholds. Measurable thresholds that will trigger management responses when exceeded will be established for all Rapid Response and Response Monitoring projects. Each project will have a “yellow light” and “red light” threshold that triggers different levels of review and response. Based on studies already completed, the thresholds identified in Table S-6 have been determined for the property-wide water temperature, Class II BACI, tailed frog, and southern torrent salamander monitoring projects. Thresholds for the other projects will be established based on data collected from reference sites and appropriate statistical analysis in the time-frame identified in Table S-6.

**Table S-6. Yellow and red light thresholds for Rapid Response and Response Monitoring projects.**

Monitoring Project/Program	Yellow Light Threshold	Red Light Threshold
Annual Property-wide Water Temperature Monitoring of Class I and II Watercourses	<ul style="list-style-type: none"><li>A 7DMAVG above the upper 95% PI described by the regression equation: <i>Water Temperature (°C) = 14.35141 + 0.03066461x square root Watershed Area (acres)</i>, <u>or</u></li><li>Any statistically significant increase in the 7DMAVG of a stream where recent timber harvest has occurred, which cannot be attributed to annual climatic effects.</li></ul>	<ul style="list-style-type: none"><li>A 7DMAVG above the upper 95% PI plus one °C as described by the regression equation: <i>Water Temperature (°C) =15.35141+ 0.03066461x square root Watershed Area (acres)</i>,</li><li>An absolute value of 17.4 °C (relevant for fish), <u>or</u></li><li>A 7DMAVG value that triggers a yellow light for three successive years.</li></ul>
Class II BACI Water Temperature Monitoring	<ul style="list-style-type: none"><li>A statistically significant treatment (harvesting) effect in at least 3 of 8 BACI experiments.</li></ul>	<ul style="list-style-type: none"><li>Significant treatment effects continuing for 3 successive years following treatment in at least 3 of 8 BACI experiments.</li></ul>
Tailed Frog Monitoring	<ul style="list-style-type: none"><li>Any statistically significant decrease in the larval populations of treatment streams relative to control streams, <u>or</u></li><li>A statistically significant downward trend in both treatment and control streams.</li></ul>	<ul style="list-style-type: none"><li>A statistically significant decline in larval populations in treatment streams relative to control streams in &gt;50% of the monitored sub-basins in a single year;</li><li>A statistically significant decline in treatment vs. control sites continuing over a three year period within a single sub-basin; <u>or</u></li><li>A statistically significant downward trend in both treatment and control streams that continues for 3 years or more.</li></ul>
Southern Torrent Salamander Monitoring	<ul style="list-style-type: none"><li>Any extinction of a sub-population, <u>or</u></li><li>An apparent decline in the average index of sub-population size in treatment sites compared to control sites.</li></ul>	<ul style="list-style-type: none"><li>A statistically significant increase in the extinction of treatment sub-populations relative to control streams, <u>or</u></li><li>A significant increase in the net rate of extinctions over the landscapes.</li></ul>
Spawning Substrate Permeability Monitoring and Road-related Sediment Delivery (Turbidity) Monitoring	Will be established after five years of data collection for each project.	
Class I Channel Monitoring and Class III Sediment Monitoring	Will be established after 10 years of data collection for each project.	
<b>Codes</b> BACI = Before-After-Control-Impact PI = prediction interval 7DMAVG = highest 7-day moving mean of water temperature		

### ***Adaptive Management***

The purpose of the Adaptive Management Measures is to incorporate the results of the Effectiveness Monitoring projects into Plan implementation and provide the basis for necessary modifications to Plan measures over the term of the Permits. Measures include but are not limited to:

1. Initiating internal review by Green Diamond, review by the Services, and/or review by a scientific panel as specified in the Plan when yellow or red light thresholds of Rapid Response or Response Monitoring projects are exceeded and in response to results of the SSS Delineation Study, SSS Assessment, or Experimental Watersheds Programs.
2. Limiting the modifications that can be made under the adaptive management process to:
  - Changes to RMZ widths and prescriptions that are within the range of options either under state forestry regulations applicable at the time the change is made or the interim Northwest Forest Plan riparian measures;
  - Changes to SSS default widths and slope gradients after they have been set based on results of the SSS Delineation;
  - Changes to SMZ default prescriptions based on results of the SSS Assessment, with the prescriptions ranging from no cut to even-age management;
  - Changes that would increase the rate at which high and moderate priority sites are treated during the first 15 years of the road decommissioning and upgrading program; and
  - Changes to the drainage structure and erosion control prescriptions in the Road Management Measures.
3. Establishing an Adaptive Management Reserve Account (AMRA) to fund implementation of adaptive management measures over the Permits' term, in which:
  - The AMRA and the costs of implementing adaptive management measures will be expressed in terms of fully stocked acres (FSA);
  - The opening balance of the AMRA will be 1,550 FSA;
  - Credits and debits will be calculated in terms of acres harvested or retained as a result of a proposed change;
  - Debits for road-related adaptive management measures will be limited to 2% per year of the opening AMRA balance (i.e., the equivalent of 31 FSA);
  - No limits will apply to the annual use of the AMRA for RMZ or SMZ modifications; and

- No adaptive management change will be made unless there is a sufficient balance in the AMRA to make the change.

### ***Implementation Monitoring***

The purpose of the Implementation Monitoring Measures is to track and facilitate compliance with the provisions of the Plan. Measures include but are not limited to:

1. Designating a Plan Coordinator to work in conjunction with Green Diamond RPFs, fisheries, wildlife, and geologic staff to identify the provisions of the Plan applicable to individual THPs and document compliance with the Operating Conservation Program on the THP level;
2. Providing the Services with biennial reports that summarize compliance with the Operating Conservation Program, results to date of the Effectiveness Monitoring Measures, and any field reviews conducted in the period since the last report.
3. Scheduling annual meetings with the Services for the first five years of the Plan, with the annual meeting in the second and fourth years followed with a field review of implemented conservation measures.

In addition, the Services may audit the efficacy of the RMZ measures annually, by selecting three to five harvest units and requiring Green Diamond to gather before/after data and calculate an estimate of relative change in 'full tree equivalents' (FTE). The protocol used in the potential recruitment of LWD report (Appendix B of the AHCP/CCAA) will be used in any future audits. If the results of the audit indicate that the FTE values were reduced by more than 3.2% post-harvest, then the Services may call a meeting with Green Diamond to recalibrate the interpretation of the likelihood to recruit judgment in the field. The 3.2% post-harvest FTE value reduction is a trigger for recalibration of the interpretation. If an agreement cannot be reached in the recalibration among the Services and Green Diamond, then the dispute resolution provisions of the Plan will be initiated.

### ***Special Project***

The purpose of the Special Project is to examine the potential conservation benefits of transporting coho salmon and possibly other salmonids around barriers to spawning and rearing habitat. Green Diamond proposes to undertake a 10-year project that will entail trapping coho salmon in a stream with a barrier to spawning and rearing habitat, transporting them around the barrier during spawning season, and monitoring subsequent spawning, rearing, and out-migration. Prior to undertaking the project, Green Diamond will evaluate the selected stream based on criteria specified in the Plan to determine that salmonids residing in the basin above the barrier will not be adversely affected by the project.

### ***Changed Circumstances***

The purpose of the Changed Circumstances Measures is to address reasonably foreseeable changes in habitat conditions and the status of Covered Species in the Plan Area. Five types of changes are identified in the Plan as potential "changed circumstances" as defined in applicable federal regulations and policies:

- Fire covering more than 1,000 acres within the Plan Area or more than 500 acres within a single watershed within the Plan Area, but covering 10,000 acres or less;
- Complete blow-down of more than 150 feet of previously standing timber within an RMZ, measured along the length of the stream; but less than 900 feet of trees within an RMZ, due to a windstorm;
- Loss of 51% or more of the total basal area within any SSS, headwall swale or Tier B Class III watercourses as a result of Sudden Oak Death or stand treatment to control Sudden Oak Death;
- Landslides that deliver more than 20,000 and less than 100,000 cubic yards of sediment to a channel; and
- Listing of a species that is not a Covered Species but is affected by the Covered Activities.

If such circumstances occur, Green Diamond will implement the applicable supplemental prescriptions specified in the Plan.

### ***Unforeseen Circumstances***

Unforeseen circumstances are substantial adverse changes in the circumstances affecting Covered Species in the Plan Area that cannot be reasonably anticipated in the Plan. Should unforeseen circumstances occur, modifications to the Plan will be made only in accordance with the procedures set forth in the IA.

## **ASSESSMENT OF CONSERVATION STRATEGY'S LIKELY EFFECTIVENESS**

To assess the likely success of the proposed conservation strategy in fulfilling the Plan's purposes, Green Diamond evaluated the potential effectiveness of the identified measures in avoiding take of listed Covered Species, minimizing and mitigating the effects of authorized take, including cumulative impacts, and providing conservation benefits to listed and unlisted Covered Species.

### **Impact Avoidance, Minimization, and Mitigation**

Although the take avoidance and "minimize and mitigate" standards are legally applicable only to the species covered by the ITP, the Plan applies both to the ESP Species as well. Application of these standards to the ESP Species helps to ensure that jeopardy is avoided. Moreover, the minimization and mitigation measures are themselves "conservation" measures that help to provide the early benefits for ESP Species as called for in the CCAA policy. Likewise, the ITP Species benefit from the measures applied for the conservation benefit of ESP Species; and such conservation benefits go beyond those required to minimize and mitigate the impacts of taking and avoid jeopardy to the ITP Species.

The impact of the different factors that can potentially cause take of the Covered Species is highly variable. As previously noted, populations of animals have one or

more limiting factors that act on different life history stages to ultimately limit the growth of the population. The factors can interact in complex ways spatially and temporally, which make it difficult to know with certainty which factor or factors are actually limiting. As a result, the Plan is designed to address each of the potential impacts that might cause and result from take of the Covered Species. However, it is important to put the greatest effort into those factors that have the greatest probability to be limiting for the Covered Species. The primary limiting factor within each HPA, the Covered Species most affected by that limiting factor and Covered Activities, and the primary measures in the Operating Conservation Program that address such impacts are identified in Table S-7. In Green Diamond's view, the conservation strategy, as designed to address these limiting factors that could be associated with or exacerbated by Covered Activities, will more than minimize and mitigate the impacts of taking (including cumulative impacts) and avoid jeopardy to the Covered Species.

### **Conservation Benefits**

In addition to the measures to avoid or address specific impacts, the Plan includes measures to improve conditions for the Covered Species and/or their habitats. These additional measures provide a level of mitigation that exceeds the anticipated impacts of taking. Examples include the road decommissioning and upgrading measures (and the accelerated implementation of the measures) and the LWD recruitment measures. Green Diamond also believes that the Plan as designed provides for a significant improvement in the habitat conditions for all Covered Species within the Plan Area in all HPAs. In particular, the Road Management Measures will significantly accelerate the recovery of stream conditions negatively impacted by sediment, and other measures will provide similar improvements of habitat conditions.

The conservation benefits provided by the additional measures also provide extra confidence that the Plan meets and in some cases exceeds the ITP and ESP standards that apply to each identified impact. Stated another way, the extra measures supply added assurance that a sufficient level of conservation is being provided to address any concern about the sufficiency of any particular measure to address the extent of a particular type of impact. Furthermore, the improvement in conditions that will result from these measures exceeds that needed to meet the ITP "minimize and mitigate" standard and will contribute both to the recovery of the ITP Species and to efforts to preclude the need to list the ESP Species.

### **ALTERNATIVES CONSIDERED**

Green Diamond considered alternatives to the taking of listed Covered Species and alternative conservation strategies for listed and unlisted aquatic species. The alternatives and the reasons they were not selected are summarized below.

**Table S-7. Summary of limiting habitat factors for the Covered Species and the relative benefits of the conservation measures for each HPA.**

<b>HPA</b>	<b>Primary Limiting Factor(s)</b>	<b>Covered Species Most Affected</b>	<b>Most Relevant Conservation Measures</b>
<b>Smith River</b>	Lack of LWD resulting in limited rearing habitat (summer and winter) for most salmonids	Primarily the anadromous salmonids	Riparian measures that promote LWD recruitment
<b>Coastal Klamath</b>	General lack of wood and excess sediment (coarse and fine) in some watersheds resulting in limited rearing habitat for salmonids and embedded substrates for amphibians	All of the salmonids and to a lesser extent the amphibians	Riparian management, slope stability, and road management measures
<b>Blue Creek</b>	Lack of LWD resulting in limited rearing habitat for most salmonids	Primarily the anadromous salmonids	Riparian management measures that promote LWD recruitment
<b>Interior Klamath</b>	Excess sediment resulting in embedded substrates and aggraded channels	Primarily tailed frogs and resident salmonids	Road management and slope stability measures
<b>Redwood Creek</b>	Excess sediment resulting in embedded substrates and aggraded channels	Primarily resident salmonids and the amphibians	Road management and slope stability measures
<b>Coastal Lagoons</b>	Excess sediment (mostly fines) resulting in embedded substrates	Primarily cutthroat trout and the amphibians	Primarily road management measures that reduce fine sediment inputs to watercourses
<b>Little River</b>	Excess sediment resulting in embedded substrates and aggraded channels	Primarily the amphibians and the anadromous salmonids	Primarily road management measures
<b>Mad River</b>	General lack of wood and excess sediment (coarse and fine) in some watersheds resulting in limited rearing habitat for salmonids and embedded substrates for amphibians	All	Riparian management, slope stability, and road management measures
<b>North Fork Mad River</b>	Excess sediment resulting in embedded substrates	Primarily the amphibians	Primarily road management measures
<b>Humboldt Bay</b>	Excess sediment inputs from geologically unstable areas resulting in aggraded channels and embedded substrates	Primarily the anadromous salmonids	Slope stability and road management measures
<b>Eel River</b>	Excess sediment inputs from geologically unstable areas resulting in aggraded channels and embedded substrates	Primarily the anadromous salmonids – there are few salmonids and no known amphibian populations in this HPA	Road management and slope stability measures, but the limited numbers of covered species in the HPA would put it at the lowest priority

No Permits/No Plan. Green Diamond would not seek authorization for take of the Covered Species; and timber operations and related activities would occur in accordance with existing state and federal regulations, Green Diamond's ITP for northern spotted owls, and Green Diamond's timber management policies and practices. Green Diamond considered but rejected this alternative because it does not offer a long-term solution for reconciling Green Diamond's operations with ESA requirements. Further, Green Diamond believes that the Plan will have significant beneficial effects for Covered Species not possible under this alternative.

Listed ITP Species Only. The Plan and Permits would cover only currently listed Covered Species. Green Diamond considered and rejected this alternative as counter to sound planning principles. The alternative would not provide adequate long-term assurances to Green Diamond that operations could continue in watersheds covered by the Plan if one or more of the unlisted Covered Species were listed.

Simplified Prescriptions Strategy. The Services would issue the Permits as proposed in this Plan, and Green Diamond would implement a simplified conservation strategy of fixed, no-cut riparian buffers. Green Diamond considered but rejected this alternative because the permanent commitment of land and resources represented by the fixed buffers would be disproportionate mitigation for minimal impacts under a take avoidance strategy. Green Diamond also believes that the Plan is a superior conservation strategy because it would avoid take to the maximum extent practical in riparian zones while enacting additional measures to improve, not just avoid impacts to, habitat conditions.

Expanded Plan Area/Species List. The Initial Plan Area would be expanded to include an additional 26,116 acres of "rain-on-snow" areas owned by Green Diamond; the ITP from NMFS would cover the same salmonids as in the Plan; and Green Diamond would seek an ITP from USFWS for 9 species. Green Diamond considered but rejected this alternative in favor of limiting the Plan and Permit applications to the six cold-water adapted aquatic species. This decision does not preclude future amendments to the Plan to include other species or the development of separate plans and permit applications for other species. Further, Green Diamond proposes to use the AHCP/CCAA as the framework for other conservation efforts that will provide significant protection and benefits to a broad range of aquatic and terrestrial species in the Plan Area.